

Appendix A. Description of the Simulated Rural Kitchen (SRK)

The SRK is shown in **Figures A-1 - A-2**. At 8 feet \times 8 feet (244 cm \times 244 cm) with the height of the roof being 9 feet (275 cm) on one side sloping down to 8.5 feet (259 cm) on the other side, the kitchen has a volume of 16 m³.

1) SRK details: A 6.5 feet \times 3 feet (198 cm \times 92 cm) door was fixed in the south wall for entering the kitchen. There are three windows measuring of size 3 ft \times 2 ft (92 cm \times 62 cm) fitted about 3 feet (92 cm) above the ground level. There is no window in the wall where the door is fixed. There are four rectangular ventilators of size 2 ft \times 1 ft (61cm \times 31cm) fitted in four walls. Out of these, two were placed in the bottom 1.0 ft above the ground level (BV₁ & BV₂) and the other two (TV₁ & TV₂) were placed in the top (about 2.5 ft below the roof). In addition to these rectangular ventilators, five circular ventilators (CV) with a diameter of 9 inches (23 cm) are provided, out of which four were situated about 1.5 ft below the roof and one was placed 3 inches (8 cm) above the ground level. The windows and ventilators were provided primarily to vary the ventilation conditions if desired.

The entire laboratory was surrounded by an outer boundary wall with floor dimension (457 cm \times 457 cm) of 15 feet \times 15 feet and a height of 10 feet (305 cm). The function of the outer enclosure is to reduce the wind effects and to keep uniform ventilation conditions in the hut throughout the experiment. To reduce wind effects, the windows, ventilators, and door fitted in the outer boundary wall were closed during all experiments. Between runs, however, they were opened to facilitate comfort and to help bring indoor concentrations down to ambient levels.

A hood arrangement with an adjustable vertical height mechanism was set up on the one side of the kitchen for collection of emissions gases. Also two wooden platforms of the size of 3 ft \times 3ft (92cm \times 92cm) were fitted on two walls for keeping emissions gas collection bags (Tedlar bags). One platform was fixed near the hood arrangement at a height of 3.5 ft (107 cm) from the ground level. This was used to keep the Tedlar bag and sampler used for emissions gas collection. Another platform was fixed near the door at a height of 2 ft (61cm) from the ground level. This was used to keep the Tedlar bag and sampler used for simultaneous collection of indoor background air. These two wooden platforms can be folded up and latched with the help of a locking arrangement provided in the walls.

2) Hood arrangement for stoves without flue (chimney): The hood was designed so that it collects a fairly high proportion of the emission gases, while not interfering in any way with the normal combustion of the stove. Also the sample collected should represent the whole of the combustion gases and not those from one particular point.

A hood consists of a skirt portion, 4" \times 4" duct (10 cm \times 10 cm), 6" \times 6" (15 cm \times 15 cm) duct and an exit pipe. The skirt portion consists of 2 metal frames made up of 'L' section angles. One frame is rectangular in shape with the size of 3 feet \times 2.5 feet (91 cm \times 76 cm). Size of another metal frame is 4" \times 4" (10 cm \times 10 cm). These two frames were connected to each other by four angles. The structure was covered with metal sheet. This gave the structure of convergent duct. The top portion of the skirt (10 cm \times 10 cm metal frame) was connected to 10 cm \times 10 cm duct

which was overlapped by 15 cm × 15 cm duct in a telescopic arrangement. The gap between the two ducts was stuffed tightly with glass wool to prevent leakage.

The 15 cm × 15 cm duct was suitably bent and taken outside the kitchen wall through the circular ventilator fitted on the kitchen wall. This was further connected to the outer wall with 23 cm diameter circular PVC exit pipe. The exit pipe ends on the outer wall and an exhaust fan was fitted at the end in the outer wall. During all experiments, the fan was run at a constant speed to facilitate mixing and to maintain the constant flue flow rate needed for the carbon balance method.

For stoves without flue, 1.5 feet (45 cm) table was used to place the stove. Asbestos sheet was placed on the top of the table to withstand the high temperature. The height of the hood arrangement was adjusted according to the height of the stove and vessel. The hood was fixed in the metal rods fitted in the table with the help of screws. The gap between the hood and mouth of the vessel was kept between 1.5 to 2 inches (4 – 5 cm) to read the temperature in the thermometer. A stainless steel monitoring probe was placed in the 10 cm × 10 cm duct of the hood to collect samples. A thermocouple was also set near the probe to measure emission gas temperature at the point of collection. **Figure A-3** shows the hood arrangement for a stove without flue.

3) Hood arrangement for stove with flue (chimney). The hood arrangement was modified slightly to test stoves with flues (**Figure A-4**). The height of the hood was raised to its maximum level (about 240 cm from the ground level) by reducing the length of the two ducts. The stove was placed on the ground, with its chimney ending under the hood. A monitoring probe was placed into the 23 cm PVC pipe that penetrated the inner and outer walls as shown.

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Figure A-2. Simulated rural kitchen (section A-A')

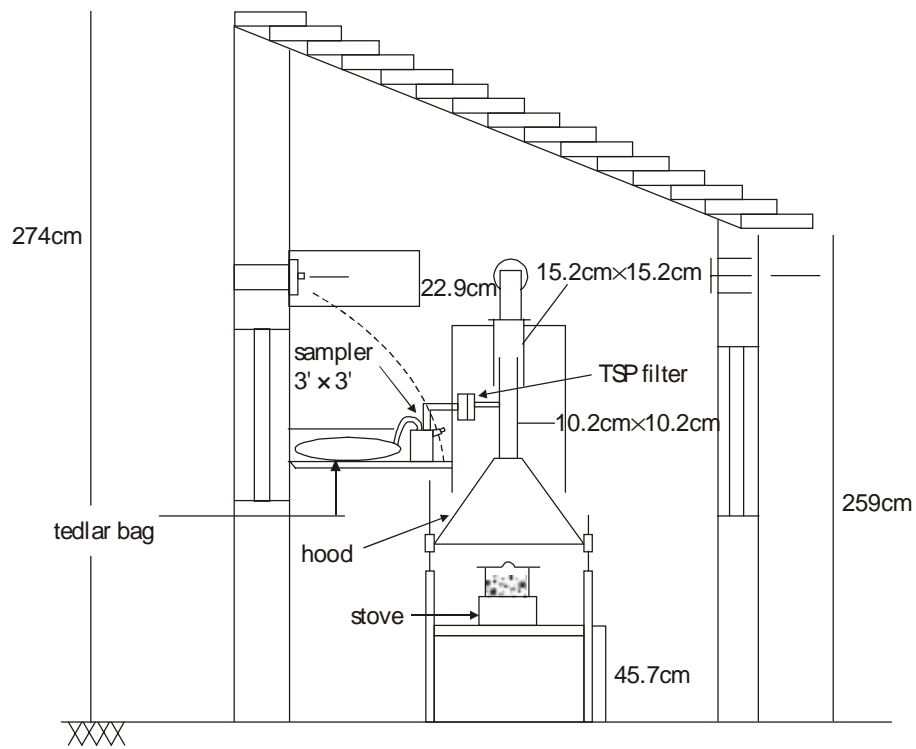


Figure A-3. Simulated rural kitchen (section B-B')

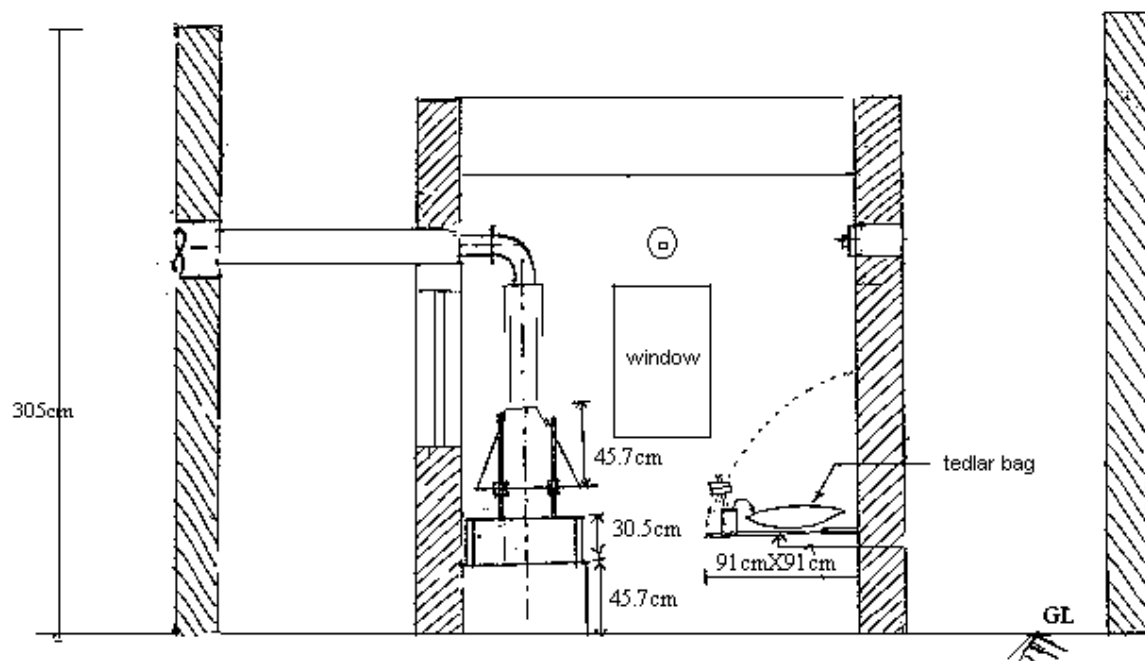


Figure A-4. Hood arrangement for stove with flue

